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1/77

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1. Your reference

01 OCT 2001

P03286GB

2. Patent application number

(The Patent Office will fill in this part)

0123575.3

020CT01 E664004 6 D02820  
P01/7700 0.00-0123575.3

3. Full name, address and postcode of the or of each applicant (underline all surnames)

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

POLYMER ENGINEERING LIMITED

Quakers Coppice  
Crewe Gates Farm Industrial Estate  
Crewe  
Cheshire CW1 6FA  
England

GB A/L 17.10.01

7953516001

4. Title of the invention

Doors and Components Thereof

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

LAURENCE SHAW & ASSOCIATES  
5th Floor, Metropolitan House  
1 Hagley Road, Edgbaston  
Birmingham B16 8TG

Patents ADP number (if you know it)

13623001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
(if you know it)

Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
  - b) there is an inventor who is not named as an applicant, or
  - c) any named applicant is a corporate body.
- See note (d))

Yes

# Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.  
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Continuation sheets of this form

Description	06
Claim(s)	03
Abstract	01
Drawing(s)	03

10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

01

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date

01.10.01

LAURENCE SHAW & ASSOCIATES

12. Name and daytime telephone number of person to contact in the United Kingdom

Laurence Shaw

0121 454 4962

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Agent's Ref. P03286GB

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## DOORS AND COMPONENTS THEREOF

10 The invention relates to a door and to components thereof. A modern door typically comprises a framework, generally rectangular as seen in elevation, the front (or outer) and rear (or inner) faces of which are covered by panels. The panels may have recesses for glass panes, letter boxes and the like. The outer vertical edges of the door has seals to exclude draughts in gaps between the door and the housing in which it is received.

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In one aspect the invention provides a door having a core comprising a body of foamed thermoset plastics, the body having generally parallel opposite sides covered by skins defining the front and rear face of the door, and an edge chassis comprising a base to contact an edge of the body and two side arms to extend from the base between the body and the skins, the outer face of the side arms being shaped to receive and retain set adhesive by which the skin and the edge chassis are held together, the base having a recess receiving the door lock, and having an extension providing a recess in which a weather seal is located.

25 Preferably spaced apart ridges are present on the outer surfaces of the side walls of the edge chassis between which is the set adhesive.

Preferably the adhesive is crosslinked and most preferably is a crosslinked acrylate. The adhesive will comprise uncrosslinked adhesive and activator thereof, and these are mixed just prior to use.

- 5 Preferably the extension projects from one side of the body.

Preferably the core body is made of a material which has a density in excess of about 250 kg/m<sup>3</sup>. The density can be higher, say about 800 kg/m<sup>3</sup> and will typically be of the order of 300 to 400 kg/m<sup>3</sup>. Cavities may be cut in such high density material to receive letter boxes and the like. The core body may be made by foaming a plastics material such as a polyurethane or phenolic resin.

Preferably at least one of the skins is a thermoset material with a low coefficient of thermal expansion. Most preferably, the skin which is to face outside, that which is to withstand ambient environmental conditions is a thermoset material, the internally facing skin may be a thermoplastic material. In another embodiment both skins may be a thermoset material, for example, each may be formed of a sheet moulding compound, for example by compression moulding.

20 In another aspect the invention provides a method of making a door wholly composed of thermoset plastics, the method comprising forming a body of structural foam, connecting an edge chassis to one edge of the body, the edge chassis comprising two side walls and a base, the outer face of the side walls having spaced apart projections, the base having a lock receiving recess and a weather seal projection and then

applying a skin and adhesive to harden to unite the skin to the side walls of the edge chassis.

Preferably, adhesive is applied to bond the skins to the structural foam.

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Preferably the edge chassis is formed by pultrusion.

In yet another aspect the invention provides a door hinge comprising two plates joined by a hinge pin at a common side, one plate being adapted for engagement with a door frame, and the other plate for engagement with the door, the door engaging plate  
10 having adjacent one side a hole for a screw member to penetrate into an edge of the door, and an extension at the other side of the plate, the extension having a hole for a second screw member, and a recess for a weather seal.

15 Preferably the hinge pin is located adjacent the extension.

In order that the invention may be well understood it will now be described by way of example only with reference to the accompanying diagrammatic drawings, in which:

20 Figure 1 is a horizontal section of one door of the invention;

Figure 2 is an enlarged section of the chassis of the door of Figure 1;

Figure 3 is an elevation showing a part of the door of Figure 1;

Figure 4A is a plan view of a door hinge; and

Figure 4B is a horizontal section taken on lines B-B on Figure 3A.

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The door of Figure 1 comprises a high density thermoset polyurethane foam core 1. The thermoset plastics may be polyester, vinylester, epoxy or phenolic instead of the polyurethane. The door has compression moulded thermoset sheet moulding compound skins 2 which are about 3mm thick. At its edge the door has a pultruded door chassis 10 shown better in Figure 2.

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The chassis 10 is a pultruded length of a thermoset material. As shown in Figure 2, the chassis comprises a base 11 which contacts the edge of the core 1. The base has a roof 12 and these are separated by sidewalls 13. These have parallel extensions 14 going beyond the base 11. The roof 12 has a recess 15 extending along its entire length to receive an extension portion 27 of a hinge (see Figure 3) and a lock assembly at an edge of the door opposite to that which takes a hinge and, to one side, is an extension 19 having a recess 16 to receive the weather seal 18. Spaced apart ridges 17 are present on the outer faces of the extension 14. The skins 2 are dimensioned to overlie the front and rear faces of the core 1, and at the sides of the door, the extensions 14 of the edge chassis. The ridges 17 define with the skins 2, grooves down or along which self-setting adhesive is applied to secure the skin to the core. The adhesive preferred is an acrylate composition which is activated immediately before use. The core 1 is rebated in the region adjacent the side walls 14.

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The rebated region may be machined out or may be formed during the formation of the core 1.

The door, as shown in Figure 1, has a raised portion 4 which defines the perimeter of a panel 5, as is best indicated in Figure 3.

The panel 5 is recessed with respect to the rest of the door and may be cut out to allow for a glazing panel, for example, to be installed. The panel 5 is sized such that a standard glazing panel with its associated peripheral beading is locatable within the aperture left with the beading being retained in the space defined by terminal edges 4A of the raised portion 4.

The door is particularly effective because being all plastics it is weatherproof and will not decay or rot. Whilst the above description states that both skins 2 are formed from a thermoset material, only one may be; the other formed from a thermoplastics material. In that case, the skin 2 which is to face the harshest conditions (usually that which is to face the outside) is the thermoset skin 2.

The door may be mounted in the frame using any suitable hinge. Preferably however the hinge is according to Figures 4A and 4B and has a plates 21 joined together with another (not shown) at a common edge defining a socket to receive the hinge pin 23. The plate 21 has spaced apart screw holes 24 one of which extends through extension portion 27. According to this invention, the plate 21 has an extension 25 facing one side of the hinge pin 23, and a screw hole 24A to receive a screw. At one side the

extension 25 has a slot 26 to receive a weather seal. When the hinge of Figures 4A and 4B is to be installed, the extension portion 19 of the door chassis 10, in that region is machined back, so as to be flush with the base 12. The hinge plate 21 is then attached to the base 12 providing a continuous recess 16, 26 along the entire length of the chassis for a weather seal. By disposing the seal in this position the seal becomes very effective when the door is closed. By disposing the screw hole 24A where shown, it is well protected by the hinge pin 23. The other plate (not shown) is joined to the plate 21 by inserting a hinge pin through their common aligned apertures (defining the socket). Screws are inserted through holes in the plate and into the frame of the door, thereby suspended or hanging the door from the frame.

CLAIMS

1. A door having a core comprising a body of foamed thermoset plastics, the body having generally parallel opposite sides covered by skins defining the front and rear face of the door, and an edge chassis comprising a base to contact an edge of the body and two side arms to extend from the base between the body and the skins, the outer face of the side arms being shaped to receive and retain set adhesive by which the skin and the edge chassis are held together, the base having a recess receiving the door lock, and having an extension providing a recess in which a weather seal is located.
2. A door according to Claim 1, wherein spaced apart ridges are present on the outer surfaces of the side walls of the edge chassis between which is the set adhesive.
3. A door according to Claim 1, wherein the adhesive is crosslinked.
4. A door according to Claim 3, wherein the adhesive is a crosslinked acrylate.
5. A door according to Claim 1, wherein the extension projects from one side of the base.
6. A door according to Claim 1, wherein at least one skin is SMC.

7. A method of making a door wholly composed of thermoset plastics, the method comprising forming a body of structural foam, connecting an edge chassis to one edge of the body, the edge chassis comprising two side walls and a base, the outer face of the side arms having spaced apart projections, the base having a lock receiving recess and a weather seal projection and then applying a skin and adhesive to harden to unit the skin to the side arms of the edge chassis.
8. A method according to Claim 7, comprising the step of forming the chassis by pultrusion.
9. A door hinge comprising two plates joined by a hinge pin at a common side, one plate being adapted for engagement with the door frame, and the other plate for engagement with the door frame, and the other plate for engagement with the door, the door engaging plate having adjacent one side a hole for a screw member to penetrate into an edge of the door, and an extension at the other side of the plate, the extension having a hole for a second screw member, and a recess for a weather seal.
10. A hinge according to Claim 9, wherein the hinge pin is located adjacent the top of the extension.
11. A door assembly comprising a door according to any of Claims 1 to 6 having a portion of the extension machined off and a hinge according to either of Claims 8 or 9 attached to the door in the region of the machined portion.

12. A door substantially as hereinbefore described and with reference to Figures 1 to 3 of the accompanying drawings.

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LS/CM/ P03286GB  
28 September 2001

**ABSTRACT**

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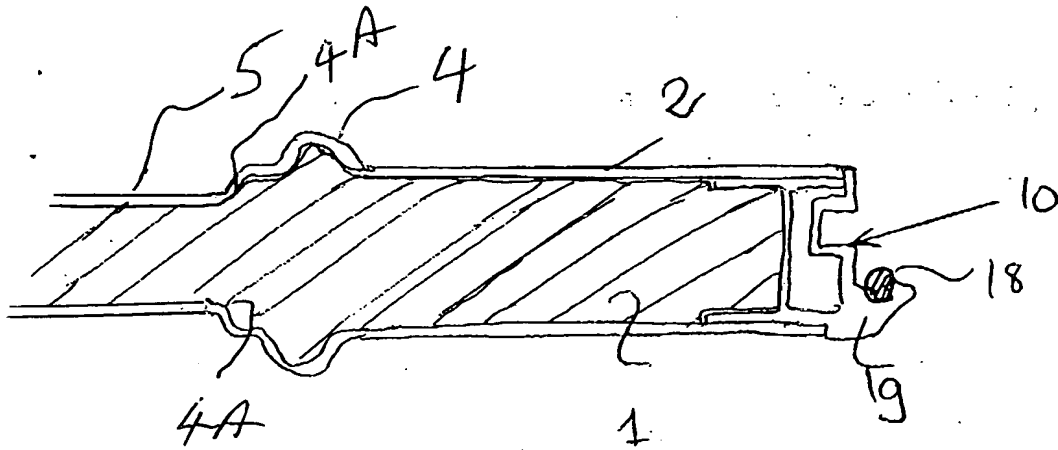
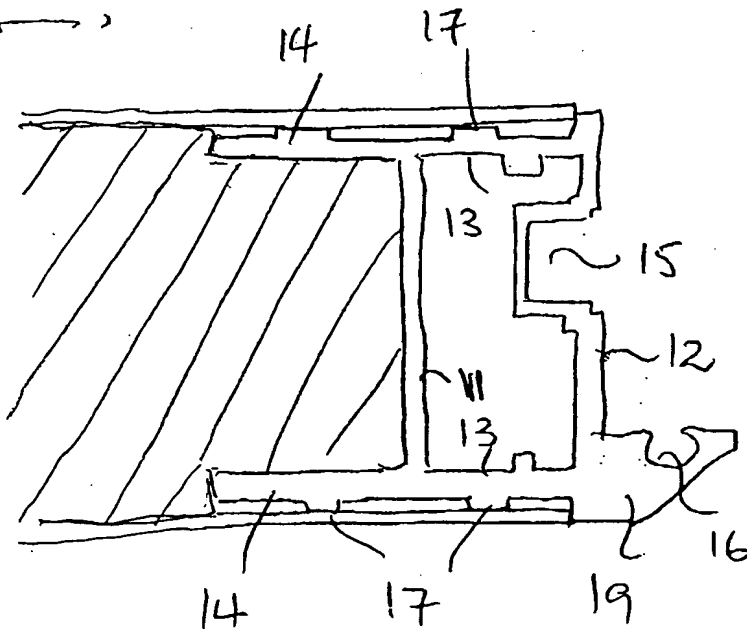
A door comprises a length of pultruded thermoset resin.

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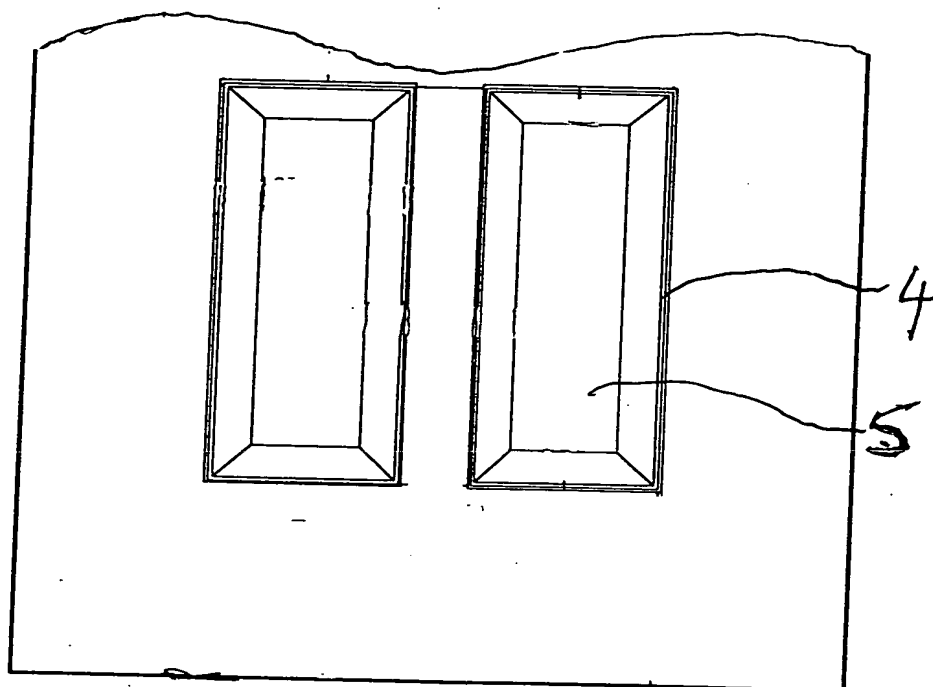
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Fig 1Fig 2

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Figure 3

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Fig 4A

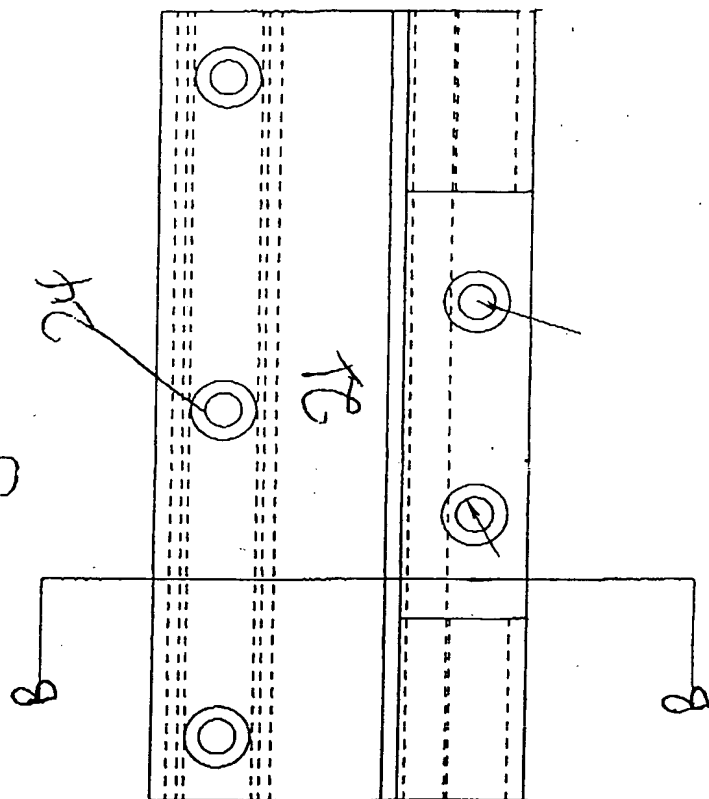
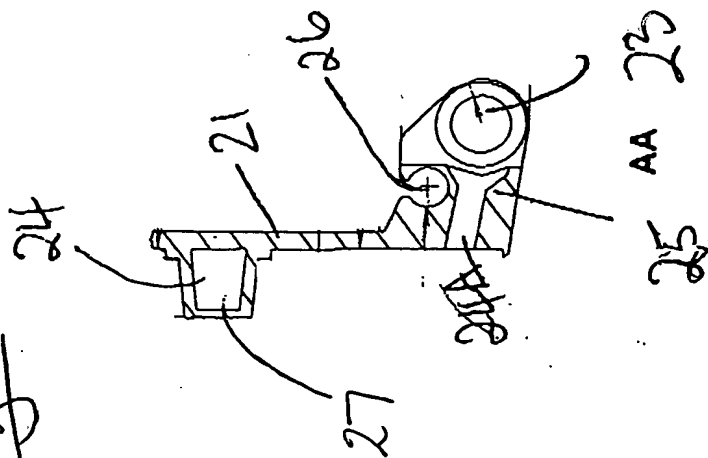


Fig 4B



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